



USAID | **EGYPT**
FROM THE AMERICAN PEOPLE

Education Consortium for the Advancement of STEM in Egypt (ECASE)

QUARTERLY PROGRESS REPORT

JULY – SEPTEMBER 2015



October 30, 2015

This publication was produced for review by the United States Agency for International Development (USAID). It was prepared by World Learning.

QUARTERLY PROGRESS REPORT JULY – SEPTEMBER 2015

Education Consortium for the Advancement of STEM in Egypt (ECASE)

Contract No. AID 263-A-12-00005

The author's views expressed in this publication do not necessarily reflect the views of the United States Agency for International Development or the United States Government.

CONTENTS

Acronyms	4
Preface.....	5
MOE / STEM Unit Support	5
New STEM Schools.....	5
Procurement	6
Assessment System.....	6
Curriculum	6
1. Summary of activities	9
2. Activities leading towards accomplishment of Program objectives	14
2.1 Project Management.....	14
2.2 Project Activities.....	16
3. Challenges and Resolutions	34
Annex I: Training.....	35
Annex II: PDI Schedule	35
Annex III: Meetings Minutes.....	35

Acronyms

21PSTEM	The 21 st Century Partnership for STEM Education
ACT	American College Testing (exam)
AIP	Annual Implementation Plan
BOT	Board of Trustees (school)
CA	Cooperative Agreement
CDRS	Curriculum Design Review Studio
CMS	Content Management System
COP	Chief of Party
DEC	Department of Educational Computing
DCOP	Deputy Chief of Party
ECASE	Education Consortium for the Advancement of STEM in Egypt (USAID)
ESF	Education Support Fund
ELP	English Language Program
GILO	Girls' Improved Learning Outcomes Project (USAID)
GOE	Government of Egypt
GTM	GoToMeeting
HR	Human Resources
IAT	It's About Time
ICT	Information and Communications Technology
LO	Learning Outcome
MAP	Management Assessment Protocol
M&E	Monitoring and Evaluation
MOE	Ministry of Education
MOHE	Ministry of Higher Education
MSI	Management System International
NCEEE	National Center for Educational Evaluation and Examination
NCC	National Center for Consultants
PARLO	Proficiency-based Assessment and Reassessment of Learning Outcomes
PAT	Professional Academy of Teachers (MOE)
PD	Professional Development
PMP	Performance Monitoring Plan
QPR	Quarterly Progress Report
SCOPE	Standards-based Classroom Observation Protocol for Egypt
SEPUP	Science Education for Public Understanding Program
STEM	Science, Technology, Engineering, Math
STTA	Short Term Technical Assistance
TDC	Technology Development Center
TIES	Teaching Institute for Excellence in STEM
TFI	The Franklin Institute
TILO	Technology for Improved Learning Outcomes (USAID)
TOT	Training of Trainers
WL	World Learning
USAID	United States Agency for International Development

New STEM Schools

Although the project's mandate limited its efforts to support 3-5 schools, and the three new opened this school year in Alexandria, Daqahleya and Assiut, the Ministry saw a great potential in STEM education and embarked on an effort to scale it up. It became apparent that the schools had a very positive effect and that the prizes won by STEM students in internationally recognized competitions during the past couple of years caught the attention of not only the Ministry, but also the Office of the President of Egypt. A mandate was given to the Ministry from the President to open more schools beyond the 3-5 schools under ECASE's Cooperative Agreement. The MOE succeeded, under a short notice, to open four more schools in Kafr El Sheikh, Red Sea, Ismaleya and Luxor, in addition to the five schools under ECASE, spending over 70 million Egyptian pounds to achieve this. The Ministry requested USAID to provide the same type of support to the four additional schools starting with the 2015-16 academic year and it was hoped for that by early October USAID would provide ECASE the approve to support these four new schools. With the expected addition of schools, ECASE could expect to be supporting 9 schools throughout Egypt in the first quarter of year 4 of the project.

MOE / STEM Unit Support

ECASE established STEM education with support from USAID and the MOE. Initial efforts relied mainly on US consultants who brought in a new system, developed the means to institute it and started working with local MOE staff to transfer know how. After developing the main elements of its mandate and before completing it, ECASE started in January 2014 as a result of a Ministerial decree to establish a STEM Unit, to provide capacity building to the members of the STEM Unit. The Unit comprises of member from NCERD, NCEEE, the offices of Science and Math Counselors within the Ministry and others. Throughout all of 2014 and a big part of 2015 the STEM Unit met weekly. During this extended period of time, STEM Unit members also visited the two operational schools and saw project activities implemented, faced challenges in implementation and engaged in solutions for these challenges.

The STEM Unit members developed and learned their STEM system technical skills by doing first by shadowing US consultants, then taking on small roles, and helping and assisting. Now, most members of the STEM Unit are well versed in the STEM system and capable of implementing the process. Because of this the project will be able to, in its fourth year, rely heavily on those STEM Unit members to train others in the governorates where the new schools are opening. The number of such well qualified STEM Unit members will need to grow as the network of STEM schools grows (the project anticipates 9 schools operating by the time this report is completed), but the project has strong partners to work with in the STEM Unit.

Local STEM Committees (LSC) are also now in place as a result of a recent Ministerial decree and such LSCs will resemble the central STEM Unit at the governorate level. They will receive support primarily from the central STEM Unit members while the US consultants will be providing additional support and engaging with needed capacity building when needed. This will create a second tier of STEM practitioners at the governorate level capable of implementing the project activities and knowledgeable about what the STEM system is and

how it can be scaled up. The MOE staff is a big part of the scaling up taking place right now.

Procurement

Large procurement processes took place this year and especially during the last quarter to prepare for the opening of the three new schools in Alexandria, Daqahleya and Assiut. This procurement was prepared throughout the year to be purchased before the schools start their operations. The equipment for the science laboratories, for example, could not be procured before the curriculum was completed. An effort was made to examine each and every learning outcome in physics, chemistry, biology, earth science and mechanics curriculum and devise the experiments needed to explain it to the students. For each of these experiments a list of necessary equipment, materials and tools was defined. Such items formed the base for the science laboratory equipment purchased for the new schools. This is how the science laboratories are an exact reflection of the science curriculum. The Fab Lab and the Electronics laboratory were also explicitly linked to the curriculum and procured. The project also collected feedback from the users -- teachers, capstone leaders and Fab Lab managers -- in the existing two schools. The greatest benefit to procuring equipment after two years of being utilized in the labs and in implementing the curriculum is that the project could fine tune its procurement needs and ensure it was procuring the actual equipment necessary to meet the needs of the curriculum and avoid unnecessary expenditures.

Assessment System

ECASE started its efforts to design a unique University Readiness Test (URT) as part of the Exit Exam third graders take when they finish their STEM school education. ECASE contracted the services of MSI to provide this product after an open competitive bid was completed. A significant part of this effort entails building the capacity of the MOE and its subsidiary NCEEE since the counselors' offices of Science and Mathematics at the Ministry and NCEEE are the entities involved in designing tests for secondary schools. Two workshops were conducted this quarter as a result of this agreement. The first was to align test items for the three components of Mathematics, Science and English with the STEM curriculum. Another workshop was to develop test items. The alignment to the STEM curriculum was done by the MOE subject counselors and NCEEE and reviewed during the workshop by the MSI experts. Further verification of the alignment was done by MSI after the workshop. The pilot test of the URT is scheduled for December and the final URT will be held at the end of the school year in June 2016. Data analyses should be done after the pilot and completed using the appropriate software. Training on the software will be necessary as part of the capacity building offered by MSI under their contract.

Curriculum

After the version two of the curriculum was fine-tuned this summer and reissued, it was uploaded to the Google Drive cloud to be accessed by all teachers. A dashboard was created for the curriculum using Google Application so all curriculum could be easily accessed and help the teachers access the curriculum and their lesson plans. The Curriculum app allows the users

to access the curriculum by subject and semester per grade, textbook resources, learning outcomes, and all other material related to the curriculum relevant to their grand challenges. All of the curriculum material was transferred to a new Google Drive domain owned and operated by the TDC. This will help ensure that the MOE and its technical arm TDC have a complete understanding and comfort with managing the STEM school systems during the life of ECASE. ECASE also requested Google to provide training to the TDC personnel to build their capacity in using Google Apps. This came after an agreement from TDC to use Google Drive over One Drive by Microsoft.

The training started this quarter and was led by a Google training subcontractor providing the training on behalf of Google. Training sessions will continue until the capacity of the TDC is to the level where they can comfortably administer Google Drive and all of its functions. It is the plan of the project to transfer the material related to the capstone projects in October to the new MOE domain and create another Google Application for it that will present a clean front end for users, just as was developed for curriculum. More applications may be needed in the future to streamline and organize the use of the resources. All other project documents related to the schools will be transferred by the end of this semester giving the Ministry full command over its ownership. The transfer of these documents not only entails the assurance that all documents necessary for the use and operation of the schools are under the MOE domain, but also that the material transferred is clean, valid, not duplicative, and in its latest form.

This year alone ECASE worked with three different Ministers of Education. While the general policies of the three Ministers were supportive of the STEM schools, the decision that affected the schools the most was the omission of dormitory construction for new schools. At the beginning of this year, ECASE had two operating schools in Sixth of October and Zahraa El Maadi, both with dormitories on their premises to house the students throughout the school year. ECASE's Cooperative Agreement calls for the establishment of 3-5 schools. The Ministry's plan was to open new schools in Borg El Arab in Alexandria Governorate, Gamasa in Daqahleya Governorate and New Assiut in Assiut Governorate. All three new schools were built, but without the necessary dormitories built on the schools' grounds. Therefore when the 2015-16 academic year started there was no on campus housing for the students and this contributed to the delays in opening these schools. In Daqahleya, a nearby accommodation was arranged and is satisfactory to the students and their families. In Alexandria the girls were accommodated, for the school year, on the upper floors of the school building where classrooms and laboratories were turned into dormitory rooms. The boys will be housed in accommodations away from the school. The issue of accommodations in Assiut was not resolved as of the end of September and if the matter is not solved the opening of the Assiut schools may be delayed until next year or students moving to the Luxor campus for a year. In brief, the decision that affected the opening of the schools the most was the delay of dormitory construction and until now, the orders to start dormitory construction in these three locations have not been issued.

ECASE started in late August 2012, less than three weeks before the opening of the Maadi STEM School for girls, and after the boys' school had been operational under MOE oversight for a year. Finally with the 2015-16 academic year the project was able to prepare an adequate

number of STEM teachers, principals and, for the first time, deputy principals in each of the new schools, in addition to procuring well-equipped schools in Alexandria, Daqahleya and Assiut. This process has taken a lot of preparation and coordination with the different Ministry senior officials and subsidiaries like PAT, NCEEE, NCERD and CCIMD. ECASE expects this time for preparation will have a positive effect on the opening of the new schools in particular and the operation of all STEM schools in general.

The confidence that has been built throughout the past three years has contributed to a level of trust in the STEM education system in general and its ability to graduate internationally capable students in particular. Students and their families witnessed the graduation of the first class in the boys school in 2014, followed by the graduation of the first class in the girls school in 2015, and the ability of the students to enroll in top public universities, their ability to gain scholarships in multiple local private universities and the proficiency of a few to get admitted in reputable universities around the world based on their STEM education. All that contributed in building trust in the new STEM system throughout the past three years. The winning of students in international competitions, also raised the positive publicity about the schools and allowed them to gain a prominent stature with families and students alike around the country. This resulted in gradually higher numbers of student applicants to the STEM schools and the building of a positive reputation around the country. This in a big part ushered in the successful opening of additional schools this year.

1. Summary of activities

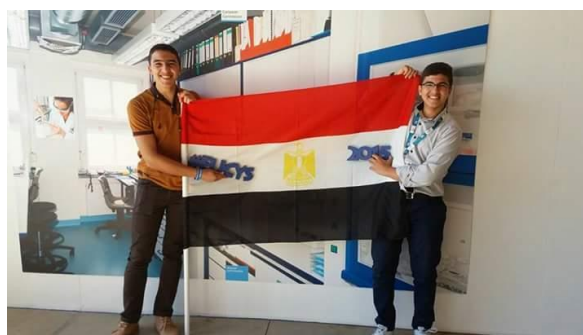
This Quarterly Progress Report (QPR) details activities and accomplishments of the USAID – funded Education Consortium for the Advancement of STEM in Egypt (ECASE) Program, from July 1, to September 30, 2015. The report discusses work undertaken by World Learning worked collaboratively with consortium partners (21PSTEM, TIES, and TFI) in close cooperation with the Ministry of Education and its affiliates.

- **Ministerial Tansiq and Student Achievements** – The STEM schools of Maadi and October have witnessed a very high level of student achievement and performance that enabled them to be enrolled in the best universities locally and internationally. The students have been accepted in the top notch faculties of Egypt such as Medicine, Dentistry, Engineering, etc. (See detailed table below). 30% of the Maadi students and 40% of the October students have been accepted in Engineering faculty, while 10% of the Maadi students enrolled in Medicine faculty while 29% of the boys enrolled in Medicine.

Faculty	# of Students Enrolled from Maadi STEM School	# of Students Enrolled from October STEM School
Medicine	9	26
Dentistry	8	4
Pharmaceutical Medicine	20	14
Veterinary Medicine	8	
Science	10	1
Engineering	26	37
Computer Science	9	9
Urban Planning		1
TOTAL	90	92

For the second consecutive year, the STEM students succeeded in achieving a large number of scholarships for local and international universities. A total of 19 students from both schools have been guaranteed full and supplemental scholarships from different donors for universities in the U.S. and Italy. In addition full scholarships were provided to students in Zewail University, Misr University for Science & Technology, Nile University, and Arab Academy for Science & Technology. These students have been able to achieve high scores and met all the requirements the institutions have requested. The scholarships were granted by the STEP Program Funded by USAID, Bank Misr, Al Alfy Foundation, Misr El Kheir, Nile University, and Sawiris Foundation.

A group of two students from October STEM school participated in the 27th European Union Contest for Young Scientists’ that took



place in Milan on Sep. 17-22, 2015. This contest is an initiative of the European Commission promoting the ideals of co-operation and interchange between young scientists. The SOL Group, a producer of technical, pure and medical gases for industry, research and healthcare, has rewarded the students 2000 EUR for their project ‘Methane Recovery from manure biogas by amine absorption for hydrogen synthesis’.

- ***New Schools Opening / Executive Committee*** – Based on the decision from the Ministry of Education to expand the STEM Schools in Egypt, the minister has formed an executive committee to manage and facilitate the new school openings. The new 7 STEM Schools are 3 schools supported by the project in Alexandria, Dakahleya and Assiut, in addition to 4 other schools in Ismailia, Kafr El Sheikh, Reda Sea, and Luxor. This committee was formed from the top leaders at the Ministry which includes advisor to the Minister, Head of GAEB, Director of ESF, Undersecretary for Secondary Education, Science and Math Counselors, Director of TDC, Hala El Serafy from USAID, and Dr. Reda AbouSerie from the project.

The main functions for the committee are to make the necessary decisions to facilitate the opening of the schools, ensure that the schools are equipped with labs, and provided with infrastructure, and ensure the staffing of teachers including their selection training, hiring and their incentives. In addition, the committee played a major role in selecting, allocating and accommodating the students in the schools, and all other necessary services. It also requested providing laptops for each student and teacher, and establishing the connectivity in all schools.

During this quarter, the committee met on a weekly basis to follow up and take the necessary decisions and in some cases it made some monumental decisions. For example, the committee took the decision to open the door to hiring teachers from outside the pool of ministry teachers. This was the first time for the Ministry to approve such a hiring protocol. The committee also set the rules for student allocation to schools since the students applicants were from all over Egypt.

- ***Teacher and leadership selection for STEM Schools*** - During this quarter, ECASE coordinated with MoE, and PAT to identify and train teachers and leaders for the new schools. Over 2300 candidates applied online for teaching and leadership positions. All candidates went through a rigorous selection process, which included passing an English screening test, a concept inventory test, successfully passing the beginning teacher training, and finally going through an interview with the counselors. 98 STEM subject Teachers and 28 Principals and Deputies made it through the initial selection process and made it to the interview. The teacher selection process was enhanced this year by involving local supervisors in encouraging the right caliber of teachers to apply.

The selection process this year also witnessed holding multiple testing locations in PAT branches in Cairo, Assiut and Damietta, which resulted in more candidates taking the language and concept inventory tests. To ensure an adequate number of applicants, ECASE supported PAT and the Counselors’ offices to hold three testing rounds. PAT provided the locations and the logistics, while the supervisors from the counselor’s office selected/modified exams, proctored the administration of exams and scored the test papers.

The teacher selection process was formulated in a draft decision memo, which is currently being reviewed to reflect lessons learnt. The decision memo will be shared with PAT and the Ministry to formally institutionalize the process.

- ***Teacher and Leader Professional Development Institute (PDI)*** – A variety of plans were drafted to support teacher and leader training for PDI over late summer, which continued to be modified even during the training weeks to accommodate travel schedules, teacher availability, and supervisor participation from the governorates. All ECASE partners collaborated to deliver an enhanced PDI. The PDI this year aimed to continue the capacity building of existing experienced teachers and support the Ministry of Education prepare for the expansion of the Egyptian STEM Schools model to new governorates. Ultimately, PDI lasted July 26 – September 17, 2015, much longer than the originally planned four weeks – in order to accommodate rolling changes and hiring of teachers. US supports were in country and provided on-going weekly supports to field staff to support the trainings. PDI covered Fab Lab orientation, capstone leadership, curriculum, and assessment PDI. A full description and schedule is included in the subsequent sections.

The PDI started with a TOT workshop for 32 potential trainers including experienced Teachers with the potential to train, STEM unit member, and certified trainers from the new governorates. The TOT was the first step in a long-term capacity building process that involves working as facilitators and taking on training responsibilities in addition to successfully completing TOT workshops.



The PDI included 23 workshops including TOT, training experienced teachers, supervisors/local STEM unit members training, preparing lab facilitators, training three groups of beginning teachers, training potential school leaders, and preparing instructors for the summer camps. PAT certified material was used in all PDI workshops. PAT was also the primary partner in calling participants for the training. A representative was present in the initial experienced and beginning teacher training. Potential Trainers participated as facilitators and trainers in some of the session. Experienced STEM trainers and experienced teachers took full responsibility providing the training to some of the beginning teacher groups in a range of topics including curriculum, assessment, capstone, and lab training.

- ***Capstone Refinements*** – After an extended review of the Capstone design, a series of updated capstone manuals certified by PAT were used for the summer professional development institute (PDI). Following the modifications applied to the capstone, new tasks were assigned to the teachers to do regarding developing learning transfer questions in order to have a bank of questions ready before the academic year starts. The PDI Capstone training for the experienced teachers focused on two parts; mainly going through the new capstone design changes and requirements, and developing learning transfer questions relative to the learning outcomes specified for each subject. More than 80 new learning transfer questions were created during the

training by the teachers; this activity strengthens the teachers' ability to teach the application of learning outcomes to new areas.

PDI Capstone training for new teachers consisted of 13 sessions covering all the different aspects of the capstone process. Starting with an introduction and simulation, then an overview on the capstone components portfolio, journals assessment, prototypes; followed by a comprehensive explanation of the rubrics for each component and its evaluation, ending by the management of the capstone sessions.



On September 30, the project team reviewed the capstone design, journal and exhibition needs and the corresponding requirements for grading and use of Google Drive to support this work. A new interface has been planned to be developed in order to facilitate the process of journal, poster, and portfolio evaluation. Furthermore, the Capstone WebApps is designed to help the STEM Unit members and the TDC to easily monitor the teachers' evaluation of the capstone and also to follow up on the progress achieved at the schools related to the Learning Outcomes.

- ***Google Cooperation with STEM schools Egypt*** - Triggered by the expansion in STEM schools, ECASE project started to pursue a higher level of partnership with Google to provide in country assistance to the TDC, schools, and Ministry of Education personnel as they adopt the Google Apps Environment and assist in completing a web app for managing the STEM school curriculum and capstone process. ECASE project contacted Google and they immediately offered one week training course to TDC on Google drive through their partners in Egypt Cloudypedia. On September 21, ECASE representatives met with Cloudypedia which provides in-country training for Google and based on a request from ECASE to Google, the latter assigned Cloudypedia to provide capacity building training to the MOE's TDC personnel to bring them up to a level where they can administer the Google Drive and later design Google Apps for the STEM schools. Cloudypedia noted that they are open to provide the services the TDC and ECASE need and the necessary support for ECASE to succeed and that he sees the services provided by ECASE to be cutting edge.

- ***University Readiness Test (URT)*** – ECASE is developing its unique University Readiness Test (URT) which should be considered to be a reliable, valid, and fair test for measuring students' readiness and aptitude to enter university following the completion of their STEM high school studies. MSI has been tasked to design, develop, and implement the URT. Our overarching goal is not only to develop the URT at an international standard of quality, but also to build the capacity of National Center for Consultants (NCC) and the National Center for Education Examinations and Evaluation (NCEEE) so that they can lead the URT work their own

after the project ends.

When designing the URT in collaboration with the NCC and the NCEEE, The project focused primarily in three areas: 1) the assessment should be of international standard, shadowing the ACT tests with respect content and psychometric quality; 2) the STEM school students should be tested on the skills and outcomes necessary for a successful postsecondary education in Egypt and/or abroad; and 3) the performance by students on the URT could serve as a good predictor of the performance in ACT. With these objectives in mind the first step was conducting an alignment workshop that is highly critical for developing a strong assessment system. The workshop was held in Cairo on July 26-30, 2015 with four specific goals:



1. Getting the participants (i.e., item writers for the URT) a complete understanding of the STEM learning outcomes and skills;
2. Identifying STEM learning outcomes and skills commonly assessed on the ACT (i.e., topic matching);
3. Determining level of alignment between ACT items (released and unreleased) and STEM learning outcomes and skills; and
4. Exposing the participants to ACT item structures and formats, and the principles behind item construction.

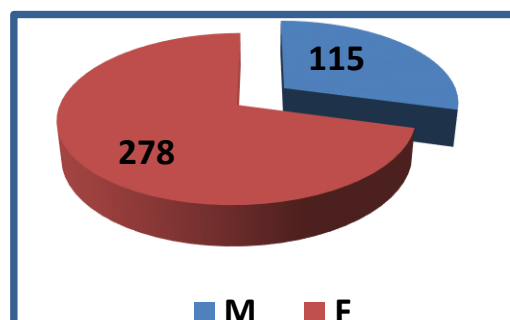
A total of 26 specialists from the NCC, NCEEE, and STEM schools participated in the workshop, with others from the NCEEE attending intermittently. In terms of the proposed content of the URT, the project observed that topics covered on the ACT would most likely be taught in Years 1 and 2 of the STEM program, with the exception of earth science and physics. This suggested that the students who graduate from the STEM program would presumably perform well on ACT. Moreover, the findings from the alignment workshop led to the development of the URT specifications with respect to depth and breadth of the topics.

After developing the URT blueprints and detailed specifications for English, mathematics, and science based on the alignment workshop, there was an item development workshop held in Cairo on September 13-17, 2015. A total of 35 subject specialists from NCEEE, MOE, and the STEM schools developed around 758 items (371 in English, 180 in mathematics, and 207 in science), which was 308 (221 in English, 30 in mathematics, and 57 in science) more items than what were originally expected. The skills built in this workshop were followed by a thorough training on item development principles and procedures at the item development workshop.

- ***e-STEM Online STEM English Teachers Training*** - A professional Development training was held to orient the STEM English teachers with the e-STEM program and help the teachers to meet the learning objectives laid out in the Trainer's Manual. By modeling the best

practices and strategies that teachers are expected to learn and ultimately use in their classrooms, the Trainer acted as a facilitator of learning who had a deep understanding of the terms, concepts and philosophies that were shared during the training, including those related to what e-STEM On line's features, functions and strategies to support students as they use e-STEM Online in their classrooms. The training took place from Sep. 6th 2015 to Sep. 10th 2015. Over the coming months, ECASE will complete the transition from face-to-face ELP to e-STEM Online.

- **Training** – During this quarter ECASE implemented the largest number of training sessions from the beginning of the project. ECASE organized 23 Training sessions for 180 trainees including TOT, training experienced teachers, supervisors/local STEM unit members training, preparing lab facilitators, training three groups of beginning teachers, training potential school leaders, and preparing instructors for the summer camps. The total number of trainees to date was 393 (287 males and 115 females). (**Annex I**)



2. Activities leading towards accomplishment of Program objectives

2.1 Project Management

In preparation for the opening of three new schools in Alexandria, Daqahleya and Assiut, the project gathered all of its partners in a two-day meeting in Cairo to discuss ECASE's implementation approach and plan. Various ideas were presented during the two days, mostly ones that represented best practices and others that showed what could be executed on the ground within an Egyptian context. The STEM Model has neared completion in the two existing schools with three more schools under ECASE's cooperative agreement and four more schools being opened and supported by the Ministry. ECASE may receive permission in October to engage with these new MOE schools as well. The replication of the model in these new schools will require the institutionalization of a STEM system and not merely a direct application of the model. The relationship among the schools, with two of them having more experience, creates a synergy that should help all schools, even the existing one.

The planning meeting ended with an agreement on the importance of coaching as a means to make sure that all the training that took place before the school year started, and in previous years, is actually taken to fruition and is being applied in classrooms. A coaching plan has been presented during the meeting and its elements discussed before its final release. Also, the selection of the Deputy School Principal as the Academic Advisor and Instructional Coach puts them in a position to have direct technical rapport with the teachers and the Local STEM Committees as their key liaison. The deputy will also be the main point of contact for all technical issues in the schools, while the Principal will be the administrative and managerial leader within the school. This division of labor created a clear definition within the schools along with the formation of the Local STEM Committees in each governorate from the supervisors of the STEM subjects so as to resemble the Central STEM Unit at the local level. It

was also agreed to start building the capacity of not only the teachers and leadership at each school, but most importantly that of the LSCs members to bring them up to a level where they are actually knowledgeable enough about the STEM system to go follow up at the schools to make sure that the schools are technically operating in an acceptable manner.

Virtual Support

The project developed a plan to provide for the new schools which are physically located remote locations, away from large cities. The plan included two types of support. The first one is virtual support which will be conducted on a weekly basis for each domain. For instance, on the Capstone domain, there will be a weekly virtual meeting via Go To Meeting. These meetings will include the Capstone Coordinator, Capstone Leader at each school. The Capstone Coordinator is one of the members of the STEM Unit who is leading this area of support. Each area of support also includes U.S. Consultants who give the necessary back up support. Areas of support include; curriculum, assessment, capstone, school management, extra curriculum activities, and IT. Each area of support is assigned with U.S. consultant, Central STEM Unit member, and project staff to coordinate all together.

The second type of support is on-site visits to the schools by Central STEM Unit members. This type of support will focus on coaching the teachers at the school in each area of support. Each STEM Unit member plans to visit two schools each week. Moreover, a report template for both virtual and on-site visits has been developed so there is standardized feedback. Alongside that, there are two ECASE Regional Managers who have received all the necessary training. They have regional responsibilities and visit them on a weekly basis and provide the on-site support. Also they provide their feedback using the report template.

2.2 Project Activities

This section summarizes key accomplishments against the revised AIP for each objective area. All project activities are part of a larger iterative process and many aspects of individual activities overlap with other activities. The summary, below, is presented according to the AIP. Tasks submitted as part of the AIP to USAID are provided in “**bold**”.

Objective 1: Increase student interest, participation, and achievement in science and mathematics with special effort to underrepresented groups such as girls and economically marginalized students.

Nearly one year ago, a manual was updated and enhanced to support *implementation of a STEM school admissions system that is criteria-based, inclusive, and transparent (Activity 1.1)*. The Student Selection Manual, including the process and criteria for attracting, interviewing, and accepting students for admissions to the STEM school, was presented to the MOE STEM Unit for review and approval. ECASE project decided to change the strategy for this activity and cooperate with NCEEE to develop an admission exam for STEM Schools based on merit and talent, not only grades. Due to the decision of opening new 9 schools this year, the process could not be completed before the starting of the new student applications. NCEEE proceed with the old exam.

Further guidance is also needed to enable advancement of training for the Board of Trustees to *promote the STEM school within the surrounding community through BOTs (Activity 1.2)*. BOTs in the existing schools are not functional and the new schools are too new to have BOTs yet. As this is an ongoing challenge ECASE is changing its strategy by starting to work directly with school administrations to identify key parents with potential to promote the STEM School within the surrounding community.

To *promote the STEM school within the surrounding community through Fab Labs (Activity 1.2b)*, The Fab Labs in both Ma’adi and 6th of October were used to create procurement requirements for the new schools in the Egypt STEM model school network. The baseline materials list and equipment list for these two schools was compared to the actual use of the equipment and materials in these labs to determine any changes that could make Fab Labs in the new schools more sustainable and more affordable. Fab Lab Egypt also contributed their experience to creating these procurement documents.

In the next quarter, the Fab Labs will be installed in the new schools by local Fab managers with support of Fab Lab Egypt staff. TIES will send an expert on the Shop Bot to provide a quality review of the installation at each school and to ensure safe and effective installation at each school.

The TDC continued their training in the three tiers of Fab Lab courses during this quarter. In the previous quarter the TDC completed tier 2 training, in which they applied their skills and competencies on the Fab Lab tools to specific prescriptive design challenges. These design challenges were designed to test their ability to make good decisions about tools and processes to

solve a problem. In this quarter the TDC cohort began tier 3 training. Tier 3 training is not unlike the end of Fab academy training but is scaled back in recognition that the participants have not received the intense training that Fab Academy offers leading up to this section. Nonetheless, the TDC cohort participating in tier 3 training is guided through open-ended projects they select themselves and therefore take more ownership in every step from design through completion. This tier requires the highest level of design skills and decision-making in a much more ambiguous, less prescribed environment. Tier three training will conclude at the beginning of the next quarter. At that time, TIES will meet with the TDC cohort to decide and design their role going forward with respect to the network of Fab Labs expanding across Egypt through the schools.

The three tiered training design for students was a prototype tested during the last school year. There were many positive outcomes from the test of this prototype, but it was also clear that the course needed to be redesigned to be more effective for the students. During this quarter we collected information on the number of students that completed the training and the issues that prevented further progress and in both cases, this was primarily due to time limitations. The after school timing for Fab Lab competed with English classes, studies and eventually the demand on the Fab Labs themselves for time needed by students to complete their capstone projects. It is a very good sign that there is such a demand for the Fab Lab for capstone projects that it interferes with structured training. It is nonetheless a problem to solve.

In the next quarter, the project will conduct a design review of the Fab Lab course prototype and develop a revised plan for the upcoming year in the existing and new schools. The review will be completed and the revisions will be documented in time for the new schools to use them when Fab Lab managers are hired and trained.

From Oct. 11th to Oct. 21st 2015 the English and Leadership Summer Camp was held to ***prepare students for the rigors of English Language based STEM education (Activity 1.3)*** a professional Development training was held to orient the STEM English teachers and MOE nominated supervisors with the camp learning objectives, student's materials, and the Trainer's Manual. The training took place for one week; 5 days, Sep. 13th 2015 to Sep. 17th 2015. The training was conducted by the project consultants in coordination with six experienced MOE TOTs.



The training Content:

- STEM Schools, English and Leadership Summer Camp, and The Training Purpose
- Language Learning in STEM Schools
- Youth Leadership in STEM Schools
- Orientation to Summer Camp Materials
- The English Placement Test

- Effective Warm-ups
- Listening and Reading English Lessons
- Writing and Speaking English Lessons
- Leadership Experiential Learning Sessions
- Leadership Input Sessions
- Speaking Assessment
- Presentations
- Microteaching
- Promoting Constructive Self-Assessment and Peer Feedback
- In and Out of Classroom Activities
- Giving Clear Instructions in an All English Class

All listed sessions included input sessions, discussions, pair and group work, leadership activities, microteaching, feedback sessions, and reflection. By the end of the training, all attendees have received soft and hard copies of the English and Leadership Summer Camp materials; students materials and teachers manuals.

To supporting the use of PARLO Tracker and free e-portfolio resources for students to demonstrate proficiency in the application of technology learning outcomes/competencies including competencies in Fab Lab (Activity 1.3.8). The school administrator front end interface was coded and tested and a user guide was created. Training data was loaded into the system and training documents were revised accordingly. During the summer PDI, existing teachers were provided and overview of the new user interface along with a compare contrast to the old system. These teachers worked in discipline groups to assist each other with navigating through the system. Also during the summer PDI, new teachers were provided the PAT training for the Tracker System. Both existing and new teachers were provided a user guide for the system. The Tracker Trainer worked with Egyptian Staff to start transitioning this training over. In addition, the School Administrators attended the teacher training and were given a tutorial on the various reports they can run in the system. School Administrators were provided with a copy of the user guide for their personal reference.

A full Tech Transfer plan is being developed to turn the Tracker system over to Egyptian staff for sustainability. As part of this tech transfer, new modules are being developed for the front end user interface to alleviate the technical back end person of more “day-to-day” activities. System documentation for Developers and front end user guides for System Administrators will need to be developed. In addition, weekly coaching will be provided to both Teachers and School Administrators to assist them in navigating the system and implementing it in the schools and classrooms. Student orientation documents and presentations are also being developed.

To enable *Outreach to Egyptian Preparatory Schools (Activity 1.4)*, ECASE received the books that were agreed upon in cooperation with the International Book Bank to enhance the learning and teaching of science and mathematics. During this quarter, the project started sending books to the targeted governorates. The sets of books were sent to 23 governorates with instructions to deliver to the Science Exploratory Centers, the Learning Resources Centers and

experimental schools. Instructions also included guidance on how to disseminate information about the books to teachers and students.

Objective 2: Strengthen the STEM School local initiative through developing an effective model of specialized high schools focusing on science, technology, and mathematics for gifted students.

Tailoring the STEM School to the surrounding community through school specialization (Activity 2.1) is most relevant to the new schools that are more regionally based. The Ma'adi and 6th of October schools draw students from many governorates, which suggests localization is useful only to create a relationship with the local community. A Board of Trustees will aid this process when implemented.

During this quarter the focus was on creating processes for the new schools. Newly selected teachers are undergoing training in PDI. Supervisors in each governorate are being identified and assigned to fulfill the local STEM committee issued in decree. BOTs have not yet been formed. As a result, there were no local stakeholders to take part in asset mapping at each of the new schools. Preliminary efforts were undertaken by the field team based on their prior knowledge of the regions. This exercise was also halted in favor of focusing efforts on the developing plan for the basic needs of the new schools.

Asset mapping, while normally conducted prior to the opening of school, will be deferred to next quarter after the schools open. The asset mapping process will be conducted through the leadership of the schools in an effort to help them reach out to their community and engage the resources that surround them. This will come through the project team members assigned to coach the building leaders. It is expected that asset mapping will focus on those assets that could inform future capstone designs that are localized for the new schools. However, in the near term, capstones will be identical across the new schools. Therefore, the value of asset mapping will be to identify those potential partners that the students might be able to use as external experts for their capstones.

Plans to conduct Design Studios focused on asset mapping with local stakeholders to contextualize their curriculum through the Capstones were postponed indefinitely until local stakeholders are identified and available to participate.

As the network of Egypt STEM Model schools increases, policy decisions must be made about assessments that will be shared and synchronized (given simultaneously) and assessments that will not. For example, final exams will likely be identical for all of the STEM schools and synchronized in time and content. But other assessments throughout the semester may not need to be synchronized to prevent “cheating” because they are not identical from school to school, or what is expected of students is already common knowledge and there is no value in sharing this information with other schools (eg. laboratory practicals where the students know what the challenge will be).

During this quarter, the decision was made that capstone assessments (Journal assessments) would be synchronized across all of the schools. Teacher contributions to these journal questions occurred during PDI, and as a result we have a question bank of more than 80 questions from which the central STEM Unit along with their project support team can develop the final questions used across all schools this year. In addition,



work began on the Google Drive Journal management system to permit simultaneous proctoring of the journal assessments and a uniform approach to grading and reporting grades across all schools. Testing and implementing the journal process with questions finalized by the STEM Unit and its project support team as well as the Google Drive Journal management system will begin the next quarter, with Ma'adi and 6th of October schools testing the system before the new schools start with Grade 1. The journal evaluation process has been streamlined so that the same steps carried out last year can be taken from a centralized webapp which simplifies the tools and allows oversight by STEM Unit personnel. These changes reduce effort for current teachers and establish a simpler process and management tool for the new schools.

In the current quarter, ECASE Project ***provide essential educational infrastructure to support experiential classroom activities (Activity 2.2)***. A major procurement effort was carried out to prepare for the opening of the three new schools in Alexandria, Daqahleya and Assiut. for science lab equipment, Fab Labs, textbooks, IT equipment and laptops for students, as essential items for the proper functioning of the schools. As mentioned in the last quarter ECASE succeeded in developing a new list of science lab equipment based on the curriculum's learning outcomes. The project procured 630 Laptops to be distributed within grade 10 in the five schools. In the effort of preparing 3 Fab Labs in the new schools, the Purchase Order was issued for Fab Lab machines and 7 desktops (desktops already delivered). Also PO was issued for the science lab equipment and material. IT network was completed in the three new schools including network and electricity upgrade. Textbooks for Chemistry, Physics, Earthcom and Biology were procured. A tender was issued for IT classroom equipment including desktop, data show, printers, e-beam for each classroom plus graphic calculators, servers, switches, access points, UPS, stabilizers and fire ware. The PO will be issued early October.

Based on the compiled list of required supplementary materials that was received from English teachers in October STEM school and approved by ELP team. The requested list was procured and distributed to October and Maadi Schools.

During this quarter, ECASE continued to coordinate with the MoE STEM Executive unit and local leaders to follow up on the preparedness of the schools for opening in the new academic year. Local STEM committees were invited to an orientation workshop in which they were introduced to the STEM school model and involved in a discussion around their roles in supporting the new STEM schools in their governorates.

The Public Private Partnership team seeks to *create sustainable and mutually beneficial PPPs (Activity 2.3)*, these partnerships should add value to the schools' different aspects – activities, services, finances, and logistics. It also gives direction as these can be leveraged to enable school sustainability by creating a support infrastructure for supplemental curricular activities, Fab Labs, Capstones, lab work, and other key activities.

In the next quarter, it will be important to implement a PPP strategy at the governorate level for each new school. In Cairo, a centralized PPP strategy made sense. At the governorate level, it will be important for each school to develop its own relationships with partners. The central STEM Unit, the local STEM Committee and eventually the BOT can contribute to this process in support of the principal of the school. In the meantime the project team and Central STEM Unit can work to identify likely partners in each region and begin the process of getting Ministry approval for those partners to engage the schools. In this way, each principal will have a list of preapproved partners they can approach to engage for variety reasons, including expertise and mentorship for capstones.

This quarter focus was continued given to the following activities:

- 1- **Pursuing financial sustainability:** A series of different activities were undertaken in order to expand outreach within the financial institutions:
- 2- **Networking Meetings and Events:** A series of networking meetings and events were pursued with the aim of expanding the database and establishing solid contacts within the financial institutions;

1 - **Egypt Innovates Event:** attended aiming to better understand the CSR department of different organizations goals and aims, broaden our database of potential partners and create awareness with the schools.

2 - **EMC2:** Meeting: aiming to maintain cooperation on financial level through their financial contribution to the schools tech needs, increase the financial contribution amount and employee engagement through provision of STEM lectures series –under discussion-

3 - **Cargill:** open a channel aiming to create awareness with the schools and check cooperation possibilities

4 - **Google:** aiming to maintain relationship and follow up on cooperation (apps and training)

5 - **Orascom Construction:** aiming to create awareness with the schools and check cooperation possibilities

6 - **Schneider:** aiming to maintain relationship and further explore their interest and try to translate it into hands on services

7 - **Cisco:** aiming to activate the Cisco Network Academy approved agreement and discuss opportunities for girls (Internet of Things Competition)

8 - **Banque Du Caire:** aiming to create awareness with the schools and check financial cooperation possibilities

9 - **National Bank of Egypt:** aiming to create awareness with the schools and check financial cooperation possibilities

10 - **Ministry Of Industry:** aiming to reach an agreement enabling students to benefit from the services of the ministry

11 – Communications with Mobinil, Vodafone and Etisalat: Contribution with connectivity to new schools. Finally Mobinil agreed to donate 1050 USBs but not yet received.

To *organize extracurricular Activities feeding STEM program implementation (Activity 2.4)*, ECASE continued to work with the MOE STEM Unit on enhancements to the strategy represented in the manual created and submitted during last year. The Executive Committee verified the work documented in the previous Quarterly Report, and the outside agencies that had applied to work with the students by providing Supplemental Curriculum Activities were approved. The manuals, rubrics and competition guidelines were presented to school leaders during the PDI this quarter and they received training on how to begin the process of offering Supplemental Curriculum Activities in their schools and how to being talking to and preparing students for competitions.

With the addition of new schools, the STEM Unit subcommittee has begun to work with the providers to ensure that the programming can be delivered at all schools. The subcommittee also created a presentation to deliver to school leaders during their additional training in October and can also be used during student orientation. No activates organized during this quarter due to summer vacation.

Objective 3: Build the capacity of highly qualified cadre of STEM professionals and provide opportunities for training and sustained, intellectually rigorous professional learning.

The overall objective this quarter was to prepare teachers for the rigors of STEM education. All STEM teachers are recruited from the Ministry of Education teachers. After a thorough selection process led by PAT, teachers were appointed in schools by the Ministry. The efforts exerted by ECASE before the start of this year were all geared to preparing MOE teachers for teaching in STEM schools. Such training comprised part pedagogy and another that deals with the content of the curriculum and how to use it. Another very important part is the use of the textbooks and the subject laboratory. MOE teachers are used to the use of one book for the entire year while STEM schools rely on a various resource for knowledge for the student, one of them is the textbook, let alone that there is no one book for the subject. The textbook is provided as one of the tools to collect information about a subject, lesson or a relevant topic. This is a completely alien means of teaching students in public schools. MOE secondary schools, as well, are typically not equipped with laboratories. Teachers are used to explain experiments but not practice them. STEM labs have equipment and materials that teachers have not used before. The training before the start of the school prepares teachers to actually use textbooks as reference and to use laboratories to actually practice experiments and effectively teach students.

In addition, the way the curriculum is laid out and resides on the cloud is a tool that is also new and versatile for the teacher. They are asked to prepare lesson plans before they enter the classrooms and post them on Google Drive for others to see and learn from. The crowd sourcing of lesson plans by all teachers produces robust lessons that are a collective effort from all teachers. The fact that all this is done on the cloud, allows for all STEM teachers to participate and contribute. The teachers are given a road map for their entire semester on a single subject and are offered the tools to use the various resources in a personal account created for them by the MOE TDC under a domain that is now registered under the Ministry name, owned and managed by the TDC.



This year, there were new teachers recruited primarily for the three new schools that were about to open and other teachers who have been teaching in the October and Maadi schools for the past three years. This created two levels of teachers that needed to be trained. One who is not familiar with the STEM system at all and hears about it for the first time. That type of new teacher needed much more pedagogy and extensive training in the use of the curriculum, textbooks and laboratories. And another type who is familiar with the STEM system, has been teaching in a STEM school for some time, and to a large extent is focused more nuances that need to be mastered. Training was therefore designed to cater to these two levels of teachers with the majority as new teachers and some as experienced with two tracks and goals for training.

In addition, ECASE took important steps to prepare for the proper operation of STEM schools. It invited the supervisors who form the Local STEM Committees at the governorate level and introduced them to the STEM system and its pedagogy. This was viewed as a primer course to prepare these supervisors later on to visit STEM schools in their governorates and supervise their operations in direct contact with the Academic Deputy Principal. While this effort will take the entire school year to upgrade the capacity of those supervisors, the effort started only with an introductory two weeks session.

In its efforts to make its capacity building and know how transfer more sustainable, ECASE worked to prepare trainers who are MOE personnel to be STEM trainers in the future. The idea is to eventually replace the US consultants in the future, but the process of selecting the right individuals who have the capacity and are prepared to carry out this task, who possess the right talents was very important. Several individuals were selected in the early part of the summer training and were prepared to be STEM trainers. Again, this is a long effort that will take probably the good part the school year and maybe even beyond. But, it started and is viewed as an important step to ensure the sustainability of ECASE's support beyond its life time.

All these are new methods for any new MOE teacher at a STEM schools that they have to learn and master and the training is basically designed to introduce them to all this and relies heavily on the coaching that will take place after the school starts to handhold the teachers

through this process while they are practicing it to ensure their total understanding and mastering of the tools made available to them and how to use them. Attached the PDI Schedule (**Annex 2**)

To ***adapt teacher and administrator performance standards for a STEM school context (Activity 3.1)***, Teacher selection criteria procedures were previously developed and utilized by ECASE for teacher recruitment. Now the process is completely utilized by MOE counselors and PAT. An advertisement for new teachers was issued late last quarter. Over 2300 candidates applied online for teaching and leadership positions. All candidates went through a rigorous selection process, which included passing an English screening test, a concept inventory test. The successfully passing teachers qualified to teacher training, and finally going through an interview with the counselors. The selection process this year also witnessed holding multiple testing locations in PAT branches; Cairo, Assiut and Damietta, which resulted in more candidates taking the language and concept inventory tests. To ensure adequate number of applicants, ECASE supported PAT and the Counselors' offices to hold three testing rounds. PAT provided the locations and the logistics; while the supervisors from the counselor's office selected/modified exams proctored the administration of exams and scored the test papers. The teacher selection process was formulated in a draft decision memo, which is currently being reviewed to reflect lessons learnt. The decision memo will be shared with PAT and the Ministry to formally institutionalize the process.

To support ***Build teacher capacity to effectively implement STEM curriculum in the classroom through Best Practices in STEM Pedagogy, (Activity 3.2a) and to prepare provide STEM Professional Development and Curriculum Training for New and Existing Teachers and Administrators including principals (Activity 3.4)***, Curriculum training for both experienced teachers and beginning teachers was conducted as part of the Professional Development Institute. All sessions were either co-facilitated or totally run by MOE STEM Unit members and TOTs. A comprehensive plan for curriculum coaching was developed. During the Curriculum Deep Dives, US specialists conducted virtual coaching sessions with STEM teachers specifically focused on their lesson planning and their use of instructional resources/textbooks to support their teaching. This helped introduce new teachers, especially to the process of virtual coaching so that they will be more familiar with it when it becomes initiated in their schools.

During next quarter more engagement of MOE personnel is planned as coaches, both virtually and face to face, implement the complete coaching plan as drafted. ECASE will be engaged to support three additional schools and, in addition to the existing two schools, face to face support cannot be afforded to all schools in different locations. The plan is to provide virtual support to all schools primarily by MOE personnel and trainers with intermittent support, when needed, by US consultants.

During PDI time, ECASE provided leadership training for new and existing school leadership candidates. This leadership training included an overview of the most important functions of a principal in a STEM school, the guiding principles of the STEM school, building division of a STEM school, creating a STEM school culture, effective leadership and management in a STEM school, the responsibilities of the two types of leaders in a STEM school

including the principal role and the academic deputy role, and motivation of teachers and students.

During Capstone session in PDI for newly identified supervisors. A concept of STEM schools was introduced. The capstone training began with a deeper dive into the Egypt STEM model school design and network. This introduction took the STEM school concept from a generic model to the specific aspirations, design constraints, design principles, and desired features of the Egypt STEM model school. The supervisors were led through each of these processes that are very similar to the design process used by their own students. The supervisors were shown the results of these designs that are the foundation of the new STEM schools in their region. After this introduction, the supervisors were shown capstones as a part of the integrated curriculum in their new school. The highlight of this training was an inquiry-based session on a visual representation of the capstones using an arch or a keystone, comparing it to a traditional capstone that has no structural function. By the end of the session, all of the supervisors in training had a very strong understanding of the way capstone supports the rest of the integrated curriculum and the way the rest of the integrated curriculum is supported by capstones. Supervisors then walked through a slightly abbreviated version of the beginner teacher training for capstones, ending with an attempt to have them contribute to the bank of learning transfer questions for the upcoming year's capstone journal questions. Because this was such an abbreviated training session, the results demonstrated a modest understanding of how to write effective questions that allow students to show evidence of their ability to transfer learning outcomes from one subject to another, in this case their capstone. However, since this was their first exposure, the most important outcome of understanding the foundational design of the new STEM school in their region and the role of capstone in that design was accomplished.

In addition to training for supervisors, ECASE and the MOE Capstone Coordinator who is Dr. Amany Abdel Aziz, the STEM Unit Member along with Capstone Leaders from Maadi and October Schools led training for experienced teachers that included a one-day expansion from last year's PDI design - primarily to focus on the creation of new learning transfer questions for the capstone journals. Not only did this process payoff in a much deeper understanding of the concept of learning transfer among the experienced teachers, but it resulted in questions that make up the bank of learning transfer questions for the upcoming year. During this training, the STEM Unit members and the capstone leaders participated in leading components of the training in preparation for taking over the training with the second cohort of beginning teachers. The training team met at the end of the first core training to review the training process and materials, to assign roles and responsibilities for the upcoming training, and to ensure the team was prepared. The capstone training team led by one of the STEM Unit members and supported by the capstone leaders from the two Cairo schools was very successful in training the second and third cohorts of beginning teachers. These beginning teachers in all three cohorts contributed to the bank of learning transfer questions for the journal assessments. These learning transfer questions will be used by the STEM Unit and their support team to develop the final learning transfer questions for the journal assessments for the upcoming year.

To build teacher capacity to effectively implement STEM curriculum in the classroom through creating formative classroom assessments (Activity 3.2b), The administration of Mid-term and End-of-Semester Exams were successfully developed and administered by the MOE this past school year as proposed in the Assessment Committee's Capacity Transfer Plan.

ECASE provided the framework for the assessments, worked with the MOE STEM unit to prepare a completion timeline and review process, and offered ongoing coaching, support and feedback by assessment and content experts. More details on the support provided for the development of these exams and related professional development is in the section *Midterm, Final and Practical Exams (4.2.3; Cross-reference 3.2.6)*.

ECASE project managing the process To ***assess progress through classroom observations (Activity 3.3, 3.1.3)***. The tool for this process is the Classroom Observation Scale. Teachers at all schools have received, and will continue to receive, training on this process. The school leaders, however, received several days of training and practice will be included in the October training dates. The STEM Committee is currently vetting the Classroom Observation Scale, so that they are able to more accurately understand the roles of the schools' Principals and Academic Deputies and make observations and evaluations as necessary.

Beginning in April 2015 and continuing through this Quarter, the project worked with those teachers from the Cairo schools (and additional candidates) who were ***selected to become members of first Cohort of Master Trainer trainees (Activity 3.5)***. During this quarter, ECASE supported the identification and nomination of a team of local professionals from the STEM Unit, experienced teachers and certified trainers from the governorates. The candidates completed a week-long training to prepare them to begin assisting and co-facilitating during the summer PDI a TOT in which they were introduced to the certified training manuals and were involved in practical application of delivering the curriculum and pedagogy manuals. Candidate trainers did assist and co-facilitate pedagogy, Capstone and Curriculum sessions. ToTs will receive further guidance and preparation in the field throughout the school year and will be expected to play a large role in the presentation of the Mid-Year PDI. A comprehensive vision document was drafted outlining the Trainer competences, and process for building their capacity.

To ***create a virtual STEM Professional Development Learning Platform (Activity 3.6)***, during the quarter work on Google Drive has focused on three primary tasks:

1. Migrating relevant project content to a Google Apps domain under Ministry control (@stemmaster.moe.edu.eg)
2. Creating and updating a webapp for accessing the curriculum and making lesson plans
3. Creating and updating a webapp for managing the capstone journal process

Migrating project content - This task involves creating new accounts for all project personnel, Ministry STEM unit members, and TDC staff to house users and content under a single Google Apps domain. This domain and all subsequent new school domains were created by the TDC and are under their control. Managing all project work from a single domain facilitates simpler sharing, more robust security, and allows for seamless transfer as STEM unit staff and TDC personnel can continue working as project user accounts are depreciated.

Curriculum WebApp - In an effort to streamline the front end experience for teachers and staff accessing the STEM schools curriculum, a WebApp was created which provides the following features:

- streamlined interface for looking at courses, calendars, interdisciplinary connections, and lesson plans
- the ability for STEM unit personnel to oversee lesson plan creation at all new schools
- dynamic diagrams illustrating connections across subject learning outcomes
- links to all content (on Google Drive and elsewhere) and centralized repositories for lesson plans
- automated sharing and lesson plan creation from a single template (controlled from the @stemmaster domain)

Capstones WebApp - Similarly, the capstone webapp seeks to streamline the process of managing capstones. At this point, the primary use is managing capstone journals, although this can be expanded and updated. The capstone webapp is being beta tested with the 2 existing schools before a wider release to new schools when they start their journals. It currently includes the following features

- The capstone coordinator from the STEM unit and school deputies can create journal templates which are pushed to all schools and manage journals for their school in a simple interface
- Controls for administering journals (i.e. turning them on and off and providing a shortened URL for students) are integrated into a single dashboard
- Anonymized PDFs for evaluation are automatically created and emailed to the deputy principals account for review and distribution to teachers
- Teachers can submit evaluations which are then reassigned to student work and prepped for distribution.

The TDC team continues to receive on the ground training from Clouddypedia, a local Google Apps consultancy group in Cairo, with virtual support from the project. As part of this training they are creating homepages for each of the new schools, and the webapps listed above are designed to be embedded or linked to these pages. This way, updating a single webapp will deliver fresh content or features to all schools. This site can serve as a centralized source for STEM unit/project information, but it currently being used just to hold the 2 webapps.

Objective 4: Strengthen MOE capacity at the systems and policy level to sustain and replicate these model schools.

To enable STEM Curriculum Training and Coaching (Activity 4.1), the entire ECASE team coordinated a retreat to discuss on-going supports for the existing and pending new schools. The focus of this conversation was around coaching of the leadership and teachers in each of the new schools. The strategy focuses on the project team providing supports to an academic deputy (deputy principal) in each school responsible for coaching, rather than responsible for teacher assessment as that is the principal's responsibility. The project team supplies the coaching to the academic deputy to help them in turn to be able to coach the teachers in their own school. The academic deputy will turn when needed to a collection of curriculum coaches focused on each subject. Initially, these coaches will come from the project team. Eventually, the

supervisors in the local STEM committee for each school will become these curriculum coaches. Eventually, ongoing coaching support will be developed in the central STEM Unit to support the network of academic deputies as instructional coaches. In addition to the support, the project team, as a result of this retreat, will design a peer network throughout the Egypt STEM model school network so that teachers across each subject are connected and learning from each other. This network will include Fab Lab managers. Between the strong peer networks facilitated by the central STEM Unit, and supported by the project team and the structured instructional coaching system, the retreat resulted in a strong basic framework to support the schools going forward. The teacher and MOE coaching plan has been revised multiple times and includes key focus on capstones and Fab Labs.

ECSAE project provided a variety of activities, as described below:

Practical Exam Design & Administration (4.1.1; 4.1.3; 5.1.2; 5.1.3)

In August, during the laboratory training, ECASE project worked with experienced teachers to identify the specific lab practical experiments for each semester at each grade. New teachers were provided an introduction to practical examinations. Due to the delay in dormitory construction and the preparation of new accommodation for the schools, the Ministry took a decision to delay the opening of STEM schools to give time to prepare proper accommodation for all of its STEM students. This extracted two weeks from the school year and measures had to be taken to shorten the school year to fit this immediate change based on a decision by the Ministry. It was, therefore, decided to cancel grade 1 practical examinations for 1st semester for this year only due to the late start of the year for grade 1 and the strong possibility that all materials and equipment will not be in place in all schools in time for full implementation of the laboratory component of the curriculum. Teachers will be responsible for ensuring that all grade 1 students demonstrate proficiency on required practical skills. Grade 2 & 3 practicals will continue as planned in Maadi and October because no problems necessitated the delay of school year there.

During next quarter, Grade 2 & 3 teachers will work with MOE STEM Unit members in the planning and implementation of the practical examinations as laid out in the Guide. ECASE will support the MOE in all aspects of the process as needed; however, more and more responsibility will be placed in the hands of the STEM Unit members. Additionally, even though grade 1 will not have a practical, we will engage the MOE STEM in working with the governorate supervisors who form the Local STEM Committee to start to train them on the process, perhaps even inviting them to observe grade 2 and 3 exams later in the year to introduce them to the practical aspects of STEM education.

Laboratory Equipment & Procedures (4.1.1; 4.1.2; 4.1.3; 4.1.4; 4.1.5; 5.1)

This quarter ECASE revised handbooks to support the new curriculum V.2.1 as needed. We also included simulations and more investigations. We conducted a Laboratory Pre - ToT workshop of one week (Aug. 9-13). This workshop was designed to assess experienced teachers' proficiency in conducting laboratory investigations and in their potential ability to train other teachers. Check sheets to keep record of teachers' proficiency were compiled for each

subject area. Strong ToT candidates were identified in each subject area. A Deep Dive Laboratory Workshop was held (Sept. 6 – 10) to provide training in the laboratory component of the curriculum, including practical exams, and to provide experienced teachers with the opportunity to refine their planning for laboratory investigations. On August 5 ECASE met with the MOE Science Counselor to discuss differences between Ministry procurement list and the Egyptian STEM Schools Project list. ECASE has worked this summer to transform the curriculum with each of its learning outcomes to practical experiments and tracked the equipment, instruments and material needed to apply such experiments. That process created a list of science lab equipment and material that is a transliteration of the curriculum and each of its lessons. The Ministry, opted to order science lab equipment that are similar to those found in the October school. This discrepancy between what the Ministry prefers to order and what the project decided to procure for the three new schools under its CA necessitated a discussion between ECASE and the Ministry to decide on how to equip the schools. During the initial curriculum training for governorate level supervisors (Aug. 25-27), the supervisors, they were introduced to the laboratory component of the curriculum and practical examinations.

Curriculum Training & Coaching (4.1.1; 4.1.2; 5.1.3)

Curriculum training for both Experienced Teachers (Aug. 2-4) and Beginning Teachers (8/23-25 and 9/15) was conducted as part of the Professional Development Institute. All sessions were either co-facilitated or totally run by MoE STEM Unit members and ToTs. A comprehensive plan for curriculum coaching was developed. During the Curriculum Deep Dives, US specialists conducted virtual coaching sessions with STEM teachers specifically focused on their lesson planning and their use of instructional resources/textbooks to support their teaching. This helped introduce new teachers, especially to the process of virtual coaching so that they will be more familiar with it when it becomes initiated in their schools.

Monitoring Learning Outcomes: Design and Function (4.1.3; 4.1.6; 5.1.2; 5.1)

After issuing the second version of the curriculum and fine tuning it to be V.2.1, the curriculum has been uploaded in its entirety on the Google Drive cloud to be accessed by all teachers. It also received a dashboard app that allows the user to access it by subject, grade and semester. The curriculum is now interactive for all teachers so that they can enter their lesson plans directly into it. This means that US specialists, MoE STEM Unit members, Supervisors and principals and deputies will be able to monitor lesson plan development and coach teachers where needed and appropriate.

All coaches, US specialists and MoE STEM Unit members will be charged with monitoring lesson plans and their support of the learning outcomes as specified in the online curriculum.

School & Laboratory Safety (4.1.4; 5.1.3; 5.1.5)

The safety handbook was reviewed by the US consultants and as a result, several additional segments of the safety manual have been completed. All new and experienced teachers and the school deputies were introduced to the handbook during their respective training.

The handbook, even in its still pre-final form will be available to all STEM personnel. We will conduct additional training for the MoE STEM Unit on the handbook especially in terms of supporting their taking ownership and responsibility for school safety.

Curriculum Review: Design, Conduct (4.1.3; 4.1.6; 5.1.2; 5.1.3; 5.1.5)

The project worked with Arabic, English and French teachers on their new learning outcomes and getting them into the curriculum V.2.1. We basically conducted an external curriculum review for humanities subjects.

During next quarter, the project will review all feedback from the external reviewers and will work with the MoE STEM Unit to ensure that processes are in place to conduct a review at the end of each semester with minor revisions as necessary in the spring. This will help fine tune the humanities curriculum through real practice in the classrooms and produce it in its final form by the end of this school year.

In addition, a support provided to ***continue the capstone curriculum implementation and training for all grades (Activity 4.1b)***. During last quarter an extended design review was performed resulting in the following implementation changes. All capstone documents have been uploaded to the new Google domain.

1. ECASE developed a “teacher workbook” for each Capstone grade and semester. This will help teachers throughout the semester, especially those leading Capstone Sessions. A prototype teacher workbook has been created and the final versions will be created before the August PDI during this next quarter.
 - a. The project team successfully completed the design and implementation of the teacher workbook for sessions that effectively provides lesson plans to guide the teacher and keep the students on track for their capstone. The workbooks rely upon activities guided by the teacher rather than lectures so that the students can discover for themselves the value of each component of the engineering design process. Teachers become facilitators and guides monitoring student work, and the students are taught teamwork skills, project and time management skills, and the ability to find information, all of which are critical to their own capstone. In addition, the teacher workbooks become an effective tool for principals and leaders conducting classroom observations during the capstone sessions.
2. Journal questions were prepared /presented during the Capstone Training Session prior to the start of each semester.
 - a. During PDI, an initial bank of journal questions, including learning transfer questions, were created by experienced and beginner teachers. This initial bank of questions will be turned over to the STEM Unit and their support team to refine and finalize the journal questions for the first semester.
 - b. In the early part of the next semester, the STEM Unit and its support team will finalize questions, enabling the management of the journal assessments by the STEM Unit while obtaining support from the project team. The STEM Unit will communicate with the schools to determine their progress along the calendar of learning outcomes to ensure that learning transfer questions used for the journals

are only covering learning outcomes that are actually being taught in the new school classrooms.

3. There will be 3-4 journal questions for each content area. The 3-4 Engineering Design Process (EDP) questions should cover learning objectives for English classes. These journal questions will continue to be developed directly from the Big Idea / Essential Question of the Capstone and the course learning outcomes.
 - a. The development of learning transfer questions during PDI gave the STEM Unit a headstart in creating a final bank of effective questions from across the curriculum.
4. There will be 4-5 equally spaced journal sessions.
 - a. In the next quarter, the question bank for five equally spaced journals will be put into place. The journal sessions will be evenly spaced throughout the semester and will avoid weeks where lab practicals and midterms are occurring.
5. New Journal Questions will be graded by all of the content area teachers related to that question. For example, 3-4 Physics questions will be graded by the 3 Physics teachers at the school.
 - a. In the capstone PDI, all teachers received training on the process and expectations for grading journals. They participated in norming exercises to compare good and bad answers in the training examples against the journal rubric.
 - b. In the next semester, the STEM Unit and supporting project staff will observe and assist where needed for capstone leaders as they lead the first journal assessment and the procedure for grading each of the questions.
6. Schools will schedule some of the Capstone Sessions in the Labs. For example, a Chemistry teacher may hold a Capstone session in Chemistry lab or a Physics teacher may hold a session in the Fab Lab.
7. ECASE will continue to develop additional Capstones for each grade level that can be rotated each year so that students are not able to simply use Capstone products that one of their peers created the previous year.
 - a. The design team for capstones determined that the same theme should be used each year for one grade in one semester. Each year the capstone challenge using that theme would use a different scope to prevent cheating through the use of previous years' capstone work. For example, grade 2 semester 1 will continue to use the theme of water. But beginning this year, grade 2 students will focus on the purification of water for drinking. In subsequent years grade 2 semester 1 students will also focus on water but will focus on different scopes other than purification for drinking water so that students are not tempted to turn to their grade 3 colleagues and lean too heavily on the work they did the previous year.
8. PDI was modified to meet these changes.
 - a. PDI was changed this quarter to add a full day to the experienced teacher training and beginning teacher training on capstones. These changes were designed to

deepen the teachers' understanding and skills at the end of the training, particularly in the areas of their roles during session journal proctoring and grading and the development and application of learning transfer questions.

- b. In the next quarter, a review of the efficacy of this PDI design will be conducted and modifications will be made to the training documents accordingly. Early indications are that the PDI design and materials were effective for beginning and experienced teachers, but the materials and design of training for capstone leaders is in need of redesign. In this next quarter any changes to these documents will be finalized in anticipation of the PDI between semesters.
9. More time has been added for training of capstones during the summer training sessions. All teachers had a deeper understanding of the Capstone process.
10. Grading: Within the Capstone distribution of grades, the changes of the weighting of various products of the capstone were implemented and documented in the training materials and the information was conveyed to the teachers during PDI.

ECASE also worked to ***develop Assessment Instruments for student course work aligned to STEM Curriculum (Activity 4.2)***. These various activities are described in detail below and also support Activity 3.2, to build teacher capacity to implement STEM curriculum in the classroom through creating formative classroom assessments.

ECASE fine-tuned the assessment system for years 1&2 and year 3 based on the experience of the past two years. Continued training on Formative Assessment for teachers during the summer PDI training this quarter. ECASE also provided Math, Science and humanities Learning Outcomes Training to teachers and STEM Unit members. The Project will continue providing training and online technical Support to teachers and STEM Units at the central and local levels.

Refining the Assessments and Developing an Assessment Expansion Plan (4.2.1)

All tests outlined in the AIP have been refined and improved based on careful expert review, analyses of the assessment data, and work to make sure that they are closely aligned to any changes in the curriculum. The *Capacity Transfer Plan*, previously developed by the assessment committee and submitted for review by ECASE to be presented to USAID, lays out responsibility for actual lead development of each assessment. The Assessment Committee retains a very active role in providing guidance, oversight, and review of all work, even when responsibility for development has been transferred to the MOE STEM Unit. With the opening of three additional STEM schools and four more under the auspices of the Ministry for the 2015-16 school year and the implications for the needs of increased coaching and training, ECASE has developed an expanded assessment support plan to meet the needs of these additional schools and relevant staff, from teachers to the Local STEM Committees. This plan is known as the *Assessment Expansion Plan: Training, Coaching and Consulting* and was submitted in September 2015.

The Tests of Concepts (TOC) were administered to Grade 3 students at the conclusion of the academic year during the first week of June 2015. TOCs were administered in the following

STEM courses: pure math, mechanics, biology, chemistry, earth science and physics. These Test of Concepts will, once again, be a part of the Grade 3 matrix for student acceptance to the universities. Currently, ECASE is awaiting the results of the 2015 administration of the Test of Concepts from the MOE and copies of the final versions of the tests as the offices of the Math and Science Consultants of the MOE added additional questions to the 21PSTEM developed TOCs. The ECASE assessment team had planned to content analyze the Learning Outcome test addition to the TOCs, conduct item analyses on the TOC/LO tests, and equate scores from June 2014 to the current year. Work has been delayed on this set of activities given that no data or final test forms have been provided to date.

The assessment team developed a revised set of recommendations for changes to the assessment decree during this period. These revised decrees related to assessment were reviewed within the project ranks and the project is awaiting the right time to present to the STEM Unit and the Ministry of Education to review them. Their revision would provide greater coherence and rationality to the matrix of assessments and thus ECASE will seek review of the revised decrees soon.

Training on Formative Assessments/ PAT Assessment Training Manuals (4.2.2)

The ECASE assessment staff developed a series of STEM Professional Development Trainer manuals for assessment related topics that were used in conjunction with PAT trainers and trainers from the MOE STEM unit for the summer teacher Professional Development Institute (PDI). These manuals were used by ECASE staff for training purposes, and in the future, will be used by the PAT accredited trainers when providing professional development for potential, new and veteran teachers and trainers in the area of assessment. US consultants provided professional development on formative assessment, PARLO and other assessment topics in August of 2015, during the PDI This summer.

Test of Concepts Training (4.2.4 Cross-reference: 4.2.1)

Specific TOC training for the MOE STEM Unit was not completed during this period as proposed in the Capacity Transfer Plan. This part of the Transfer Plan has been postponed until next year until an undetermined time—no time for such training has been made available. Therefore, the ECASE Assessment Committee will have to retain control of its development, despite the Capacity Plan's proposal that the development of the TOC begun to be handed over to the MOE STEM Unit during this school year. Please reference section 4.2.1 for an update on the development of 2015 Test of Concepts and a meeting with MoE regarding its part of the Grade 3 graduation matrix.

Assessment Related Professional Development and Meetings

There were no assessment related professional development or assessment focused shared meetings scheduled during the fourth quarter of year 3 of the ECASE program. With the completion and presentation of the new *Assessment Expansion Plan: Training, Coaching and Consulting*, and the opening of a new set of STEM schools, it is expected that a new set of professional development meetings for multiple assessment topics will resume during the first quarter of year 4.

Preparation for these and other professional development sessions is ongoing. In conjunction with this professional development and all assessment initiatives, the ECASE assessment committee is continuing their work on the requisite assessment manuals.

Objective 5: Support the MOE, establish and build the capacity of the MOE STEM Unit.

In efforts to *support the Ministry of Education STEM Unit and its member organizations (Activity 5.1)*, ECASE partners have continued to work with members of the MOE STEM Unit. Throughout the quarter the project consultants rely on STEM Unit members during the PDI trainings. All sessions were either co-facilitated or totally run by MoE STEM Unit members and ToTs. During PDI and specifically in the area of capstones the project transitioned from project staff leading PDI Training to the STEM Unit leading PDI training. This transition was by capstone leaders from the two Cairo schools. In addition, a capstone coordinator for the network was selected from the STEM Unit (Dr. Amany Abdel Aziz) to lead all support for the new and existing schools in the network.

3. Challenges and Resolutions

ECASE sees the jump from two schools operating for the past three years to 8-9 schools operating simultaneously to be a formidable challenge for its implementation efforts especially that it is coming during the final project year with not enough overlap with the project's life. The MOE is pushing to open 4 additional schools with USAID support and thus support from this project. ECASE pushed last year to open the three new schools or part thereof, but the Ministry was not ready with the construction, which postponed the idea of opening the three additional schools, all at once, this academic year. Although the main elements of the STEM Model are largely complete, the way they all work together to create the STEM System has not been completely tested. The window of opportunity, however, presented a golden opportunity for USAID to seize the request from the Ministry and support the opening of four additional schools. Assuming we are tasked with the additional schools ECASE will live up to the challenge and will strive to make these schools as successful as the schools already under operation and showing marked progress.

The continuous and main problem still endured by the STEM schools, even after three years of operation, is the lack of MOE qualified teachers. A recruitment process has been implemented five times, first started by ECASE and now operated by PAT, and each time the process struggled to find qualified teachers. There are two main aspects of qualifications required of each STEM teacher to teach. The first is their mastery of their subject matter content and second is their adoption of pedagogy methods that cater to the teachings of the STEM system. The latter is typically acquired by ECASE's continuous professional development efforts in the summer, semester break and throughout the year when possible. Professional development is a big part of ECASE's mandate and is delivered by the project in different forms. The mastery of the subject matter content is what constitutes a persistent impediment. Due to the fact that STEM schools enroll the best and brightest students from all

over the country, it often houses young women and men who are mastering their subjects and very well qualified with its content. It defeats the purpose of teaching if the STEM teacher is not up to par with the students. Often times the scores of teachers on subject matter exams are less than those of the students. Repeating the teacher recruitment process every time did not change much, the level of teachers is still the same, nonetheless, from time to time, we are surprised with individual teachers who score high on their concept inventory exams. Such teachers are hard to find among the MOE applicants and are quickly picked to be recruited where needs are dire. ECASE will continue with its process to find the best teachers candidates to work with PAT to recruit in STEM schools. This is a challenge that the project and the MOE will continue to study and find ways to tackle. As schools grow and the new schools add new grades the urgency for recruiting qualified teachers will not ebb, but increase.

Annex I: Training

Annex II: PDI Schedule

Annex III: Meetings Minutes